VM 560

Heavy Duty Vertical Machining Center

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Powerful vertical machining center VM 560 is built to world-class standards to assure world-class results. Powerful drives,heavy duty construction,and unsurpassed rigidity provide exceptional precision and years of trouble-free performance.

Vertical Machining Center

VM 560

Speed Spindle

VM 560 series

High speed spindle of high quality and rigidity
helps increase the efficiency and performance of the machine.

Speed Spindle

Built-in type

The built-in spindle motor and high grade balancing technology have virtually eliminated any vibration which deteriorate surface quality. The spindle is driven by a high power 22 kW (30 Hp) A.C. motor delivering an impressive 204 N·m (150.6 ft-lbs) torque.

Max. spindle speed

12000 r/min

Motor (continuous/15min)

18.5/22 kW
(25/30 Hp)

Oil mist lubrication

Cooling at motor &
Bearing housing

Minimized Non Cutting Time

Faster tool change time using cam increases productivity than previous model.

Spindle power-torque diagram

Standaard - 12000 r/min

Torque : N·m (ft-lbf)   Power : kW (Hp)

294 (217)	30 (40)
203.8 (150) 196 (145)	22 (30) 20 (27) 18.5 (25)
147 (109)	
118.6 (88) 98 (72)	
	10 (14)
	1.8 (2)

16.8 (23)
16.5 (22)
13.9 (19)
12.3 (17)
6.1 (8)
4.8 (6) 5.2 (7)

15 MINUTES
CONTINUOUS
S3 25%

0   865   1200   2600   3500   1.5 (2) 0
      1000   2000   3000   5500   9500 12000
          Spindle speed (r/min)

Automatic tool changer

Tool storage capacity
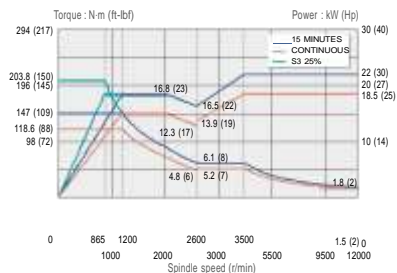
30 tools

Tool magazine

The 30 station, automatic tool changer accepts 50 taper tooling with a maximum tool weight of 15 kg (33.1 lb). Its reliable double-arm system provides 3.0 second tool-to-

Tool change time (T-T-T)

3.0 s

04   Heavy Duty
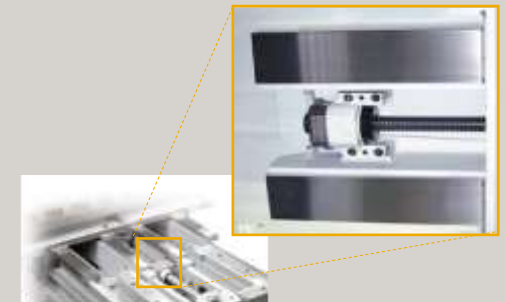Vertical Machining Center

Mechanical Structure

Strong structure and powerful processing capability!

Structure of doosan's processing know-how!

It adopts the highly durable and wide bed slide side with deep and high frequency heat treatment and allows stable transport and processing with wide z-axis slide and wide support of y-axis.

Rigid boxway type

It offers quick and powerful location control by adopting the rigid boxway type guide and double-anchor support, high accuracy and large diameter ball screw.

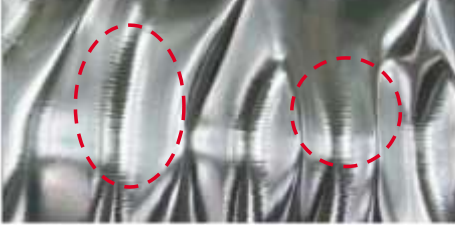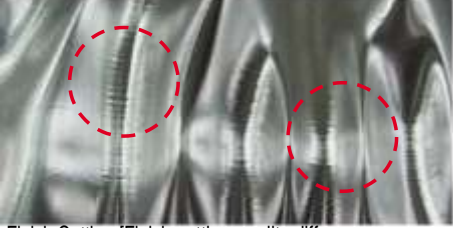tool time. The maximum diameter tool size of 125 mm (4.9 inch) can be extended to 230 mm (9.1 inch) when adjacent pockets are empty. Tool loading positions are easily accessible, and movement of the bidirectional magazine can be manually controlled.

Doosan's Exclusive [DSQ] High Speed Precision Processing

DSQ-Xplus improves productivity and molding processing quality by allowing individual tuning customized to the machine, high speed processing of the large capacity program, and enhanced order complying capability on the basis of stable structure of Doosan VM Series.

Machining condition selection

Actual Application

DOOSAN	Other Matters	DOOSAN	Other Matters
Roughing [21% time improvement]	Roughing [15% time improvement]	Finish Cutting [Better finish cutting quality compared to the competing products]	Finish Cutting [Finish cutting quality difference (insignificant)]

• By allowing the selection of the final processing condition, the processing quality and time are improved.
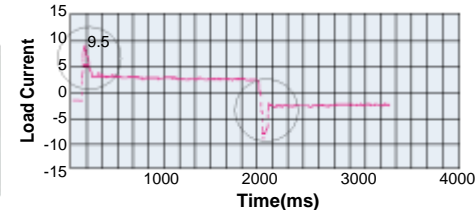
Weight balancer

Maintenance of Uniform Molding Processing Quality by Automatically Detecting the Part Weight

before
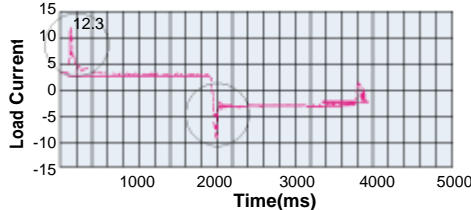
Generation of wave pattern on the processing surface with vibration at the processing beginning point / Long lasting servo current change excitation

after

Uniform brightness on the processing surface by applying Weight Balancer function / Reduced servo current change excitation

Oil Cooler Unit

Oil cooler unit to maintain the best spindle.

• Thermal displacement of the mandrel is minimized at the highest rotational speed (after 30 min. pre-heating)

• Since the oil jacket around the mandrel and heat generation parts of all moving units have the forced circulation of cooling lubricant of the oil cooling system, the whole mandrel maintains the uniform temperature to ensure high precision even during the high speed rotation.

• Temperature control within deviation of $\pm 0.1°$ is offered through the method of stopping the cooler using Daikin inverter oil-cooler and temperature control using other flow rate control.

Eco friendly & ergonomic

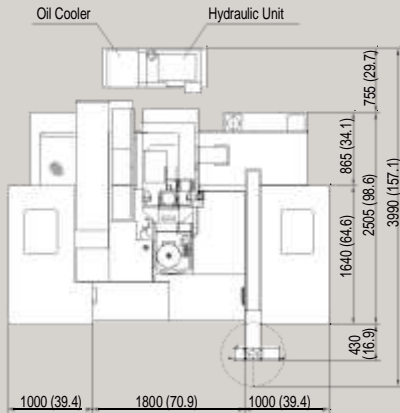To apply the magazine approaching foot hold, the tool-setting is easy and convenient.

Arranged lublication and public pressures system in one place and improved an inspection and maintenace.
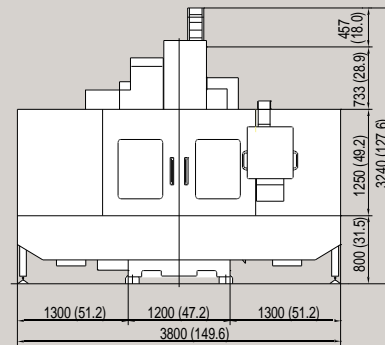
External Dimensions

VM 560

Top View
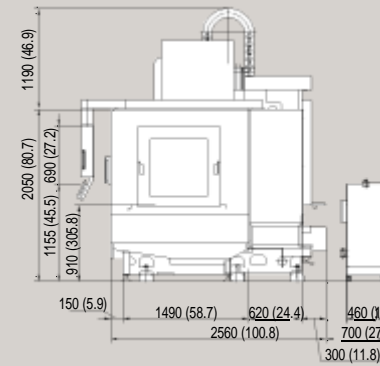

Oil Cooler   Hydraulic Unit

755 (29.7)
865 (34.1)
2505 (98.6)
3990 (157.1)
1640 (64.6)
430 (16.9)

1000 (39.4)   1800 (70.9)   1000 (39.4)

Front View

457 (18.0)
733 (28.9)
3240 (127.6)
1250 (49.2)
800 (31.5)

1300 (51.2)   1200 (47.2)   1300 (51.2)
3800 (149.6)

Side View

1190 (46.9)
2050 (80.7)
1155 (45.5)
910 (305.8)
690 (27.2)

150 (5.9)   1490 (58.7)   620 (24.4)   460 (1
2560 (100.8)   700 (27
300 (11.8)

Table

Cutting Range
275 (10.8)   1050 (41.3)   275 (10.8)
525 (20.7)   525 (20.7)
80 (3.2)
560 (22.1)
100 100 100 100
(3.9)(3.9)(3.9)(3.9)
560 (22.1)
80 (3.2)
1600 (63)

18H₈ (0.7H₈)
20 (0.8)
12 (0.5)

Detail T-Slot
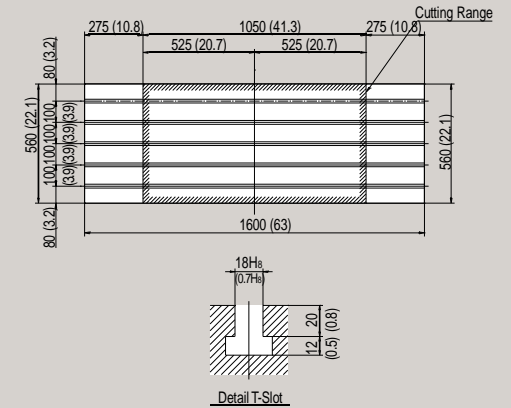
Tool Shank

BT50

MAS403P BT 50 _ Standard

23.2 (0.9)
15 (0.6)
TAPER GAGE LINE
7/24 TAPER
M24 P3.0
ø100 (3.9)
ø85 (3.4)
ø80 (3.2)
ø69.85 (2.8)
ø25 (1)
25.7 (1
60
15 (0.6)   38 (1.5)   101.8 (4)
3 (0.1)

35.4 (1.4)   35.4
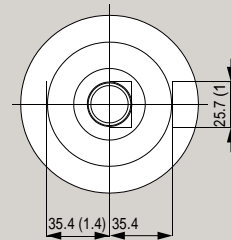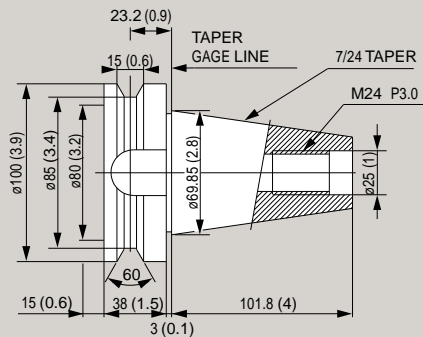
MAS403P50T-I(45) _ Standard

M24 P3.0
ø17 (0.7)
45
ø23 (0.9)
ø38 (1.5)
ø25 (1)
30
40 (1.6)   45 (1.8)
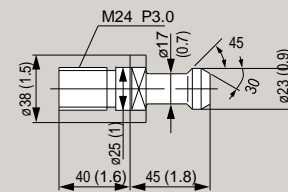
MAS403P50T-II(60) _ Option

M24 P3.0
ø17 (0.7)
60
ø23 (0.9)
ø38 (1.5)
ø25 (1)
30
40 (1.6)   45 (1.8)
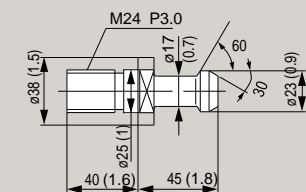
Machine Specifications

	Features		VM 560
Travel	X-axis (longitudinal movement of table)	mm (in.)	1050 (41.3)
	Y-axis (cross movement of saddle)	mm (in.)	560 (22.1)
	Z-axis (vertical movement of spindle head)	mm (in.)	560 (22.1)
	Distance from spindle nose to table top	mm (in.)	150 - 710 (5.9 -28)
	Distance from spindle center to column guideway	mm (in.)	600 (23.6)
Table	Table size	mm (in.)	1600 x 560 (63 x 22.1)
	Table loading capacity	kg (lb)	1500 (3306.9)
	Table surface		5-100 x 18H₈
Spindle	Max. spindle speed	r/min	12000
	Spindle taper		ISO#50 7/24 Taper
	Max. spindle torque	N·m (ft-lbs)	204 (150.6)
Feedrate	Rapid traverse rate (X/Y/Z)	m/min (ipm)	30/30/24 (1181.1/1181.1/944.9)
	Cutting feedrate	mm/min (ipm)	12000 (472.4)
Automatic tool changer	Type of tool shank		MAS403 BT50
	Tool storage capacity		30
	Max. tool diameter	mm (in.)	ø125 (4.9)
	Max. tool diameter without adjacent tools	mm (in.)	ø230 (9.1)
	Max. tool length	mm (in.)	350 (13.8)
	Max. tool weight	kg (lb)	15 (33.1)
	Method of tool selection		Memory Random
	Tool change time (tool-to-tool)	s	3
	Tool change time (chip-to-chip)	s	6
Motor	Spindle motor (15min)	kW (Hp)	22 (30)
	Feed motor (X/Y/Z)	kW (Hp)	4.0 / 4.0 / 7.0 (5.4 / 5.4 / 9.4)
Power source	Electric power supply (Rated Capacity)	kVA	60
	Compressed air supply	Mpa (psi)	0.54 (78.3)
Tank capacity	Coolant tank capacity	L (galon)	600 (158.5)
	Lubrication tank capacity	L (galon)	3.1 (0.8)
Machine size	Machine height	mm (in.)	3240 (127.6)
	Machine dimension (L x W)	mm (in.)	3990 x 3800 (157.1 x 149.6)
	Machine weight	kg (lb)	9000 (19841.3)

Standard Feature

- Assembly & operation tools
- Automatic power off
- Coolant tank & chip pan
- Full enclosure splash guard
- Installation parts
- Oil cooler & spindle cooling system
- Operator call lamp
- Portable 3MPG
- Screw conveyor
- Work light

Optional Feature

- 4th axis preparation
- Automatic measuring system
- Automatic tool length measurement with sensor
- Chip conveyor
- Chip bucket
- Electric power transformer
- Flushing coolant
- Oil skimmer
- Test bar
- Through-the-spindle coolant system
- Rotary table

• Design and specifications are subject to change without notice.
• Doosan is not responsible for difference between the information in the catalogue and the actual machine.

NC Unit Specifications (FANUC 18i-MB)

AXES CONTROL
- Controlled axes	3 (X, Y, Z)
- Simultaneously controllable axes	
Positioning (G00)/Linear interpolation(G01) : 3 axes	
Circular interpolation (G02, G03) : 2 axes	
- Backlash compensation	
- Emergency stop / overtravel	
- Follow up	
- Least command increment :	0.001mm / 0.0001
- Least input increment :	0.001mm / 0.0001
- Machine lock	all axes / Z axis
- Mirror image	
Reverse axis movement (setting screen and M - function)	
- Stored pitch error compensation	
Pitch error offset compensation for each axis	
- Stored stroke check 1 Overtravel controlled by software	

INTERPOLATION & FEED FUNCTION
- 2nd reference point return	G30
- Circular interpolation	G02, G03
- Dwell	G04
- Exact stop check	G09, G61(mode)
- Feed per minute	mm / min
- Feedrate override (10% increments)	0 - 200 %
- Jog override (10% increments)	0 - 200 %
- Linear interpolation	G01
- Manual handle feed 2/3 unit	
- Manual handle feedrate	0.1/0.01/0.001mm
- Override cancel	M48 / M49
- Positioning	G00
- Rapid traverse override F0 (fine feed), 25 / 50 / 100 %	
- Reference point return	G27, G28, G29
- Skip function	G31
- Helical interpolation	
- NANO AICC (AI Contour Control) 80 block preview	
- Thread cutting, synchronous cutting	
- Program restart	
- Automatic corner deceleration	
- Machine condition selection function	
- Feedrate clamp by circular radius	
- Linear ACC/DEC before interpolation	
- Linear ACC/DEC after interpolation	
- Control axis detach	
- Rapid traverse bell-shaped acceleration/deceleration	
- Smooth backlash compensation	

SPINDLE & M-CODE FUNCTION
- M- code function	M 3 digits
- Spindle orientation	
- Spindle serial output	
- Spindle speed command	S5 digits
- Spindle speed override (10% increments)	50 - 150 %
- Spindle output switching	
- Retraction for rigid tapping	
- Rigid tapping	G84, G74

TOOL FUNCTION
- Cutter compensation C	G40, G41, G42
- Number of tool offsets	64 ea
- Tool length compensation	G43, G44, G49
- Tool number command	T3 digits
- Tool life management	
Geometry / Wear and Length / Radius offset memory	
- Tool offset memory C	

PROGRAMMING & EDITING FUNCTION
- Absolute / Incremental programming	G90 / G91
- Auto. Coordinate system setting	
- Background editing	
- Canned cycle	G73, G74, G76, G80 - G89, G99
- Circular interpolation by radius programming	
- Custom macro B	
- Custom size 256kb	
- Decimal point input	
- I / O interface	RS - 232C
- Inch / metric conversion	G20 / G21
- Label skip	
- Local / Machine coordinate system	G52 / G53
- Maximum commandable value	
99999.999mm(9999.9999 inch)	
- No. of Registered programs	200 ea
- Optional stop	M01
- Part program storage	640 m
- Program number	O4-digits
- Program protect	
- Program stop / end	M00 / M02, M30
- Programmable data input	
Tool offset and work offset are entered by G10, G11	
- Sub program	Up to 4 nesting
- Tape code	ISO / EIA Automatic discrimination
- Work coordinate system	G54 - G59
- Additional work coordinate system (48 Pair)	
	G54.1 P1 - 48 pairs
- Coordinate system rotation	G68, G69
- Extended part program editing	
- Optional angle chamfering / corner R	
- Macro executor	

OTHERS FUNCTIONS (Operation, Setting & Display, etc)
- Alarm display	
- Alarm history display	
- Clock function	
- Cycle start / Feed hold	
- Display of PMC alarm message	
Message display when PMC alarm occurred	
- Dry run	
- Ethernet function (Embeded)	
- Graphic display	Tool path drawing
- Help function	
- Loadmeter display	
- MDI / DISPLAY unit	
9.5 mono LCD, Keyboard for data input, soft-keys	
- Memory card interface	

##	
- Operation functions	Tape / Memory / MDI / Manual
- Operation history display	
- Program restart	
- Run hour and part number display	
- Search function	Sequence NO. / Program NO.
- Self - diagnostic function	
- Servo setting screen	
- Single block	
- External data input	
- Multi language display	

OPTIONAL SPECIFICATIONS
- 3-dimensional coordinate conversion	
- 3-dimensional tool compensation	
- 3rd / 4th reference return	
- Addition of tool pairs for tool life management 512 pairs	
- Additional controlled axes max. 6 axes in total	
- Additional work coordinate system	
	G54.1 P1 - 300 (300 pairs)
- HPCC * (High Precision Contour Control)	
	with Risc180 block preview
- AI HPCC * (High Precision Contour Control)	
	with 64 bit Risc600 block preview
- Automatic corner override	G62
- Chopping function	G81.1
- Cylindrical interpolation	G07.1
- Data server	
- Dynamic graphic display (w/10.4 Color LCD)	
	Machining profile drawing
- Exponential interpolation	
- Interpolation type pitch error compensation	
- EZ Guide i (Doosan infracore Conversational	
Programming Solution) with 10.4 Color TFT	
- Tape format for FS15	
- Increment system 1/10	
- Figure copying	G72.1, G72.2
- Manual handle feed (1 unit)	
- Handle interruption	
- High speed skip function	
- Involute interpolation	G02.2, G03.2
- Look ahead control	G08
- Machining time stamp function	
- No. of Registered programs	400 / 1000 ea
- Number of tool offsets	200 / 400 / 499 / 999 ea
- Optional block skip addition	9 blocks
- Part program storage	1280 / 2560 m
- Playback function	
- Polar coordinate command	G15 / G16
- Polar coordinate interpolation	G12.1 / G13.1
- Programmable mirror image	G50.1 / G51.1
- Remote buffer	
- Single direction positioning	G60
- Stored stroke check 2 / 3	
- Tool load monitoring function (doosan)	
- Tool position offset	G45 - G48
- Position switch	

* : Pre discussion required

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Doosan Infracore
Machine Tools